

## CLAIMS

1. A medical analysis system for measuring at least one characteristic of urine of an individual, said system including:

5 a toilet unit mountable on a toilet bowl so as to be readily attachable and detachable therefrom, said portable toilet unit including:

a. a collection and sampling sub-unit for collecting and measuring the at least one characteristic of urine;

10 b. an electronics sub-unit for data collection and processing of the measured at least one characteristic;

c. a first communications link for facilitating data transfer between said collection and sampling sub-unit and said electronics sub-unit; and

15 d. means for removably fastening said collection and sampling sub-unit inside a toilet bowl, operative to permit ready positioning of said sub-unit in and removal from any of a plurality of toilet bowls as desired; and

a wall unit having a second communications link for facilitating data transfer between said wall unit and said toilet unit, said wall unit further including means for storing the data, and for further processing the data to determine if changes have occurred in the at least one measured characteristic of urine.

20

2. A system according to claim 1 wherein said system further includes output means operative in response to a change in the measured at least one characteristic of urine, the change being greater than a predetermined statistical threshold value, thereby to provide an output indication indicating that the individual requires further medical examination.

25

3. A system according to claim 2 wherein said output means is chosen from a group consisting of

a display displaying a text message;

a display displaying a numerical value;

30

an audio alarm;

an alarm lamp; and

a central institutional computer providing a text message.

4. A system according to claim 1, wherein said means for removably fastening is a flexible

strap, said strap in attachment with said collection and sampling sub-unit and said electronics sub-unit, and positionable over a lip of the toilet bowl.

5. A system according to claim 1, wherein said means for removably fastening is a rigid element, shaped to be positionable on a lip of a toilet, said rigid element in attachment with said collection and sampling sub-unit and said electronics sub-unit.

6. A system according to claim 1, wherein said means for removably fastening is a hanger-like element, said element in attachment with said collection and sampling sub-unit and said electronics sub-unit, and shaped to be positionable on a lip of a toilet.

7. A system according to claim 1 wherein said collection and sampling sub-unit includes at least one of the following elements:

- a sample cell;
- at least one light source;
- at least one transmission detector for detecting transmitted radiation from said light source;
- at least one absorption detector for detecting absorbed radiation from said light source;
- at least one reflectance detector for detecting reflected radiation from said light source;
- means for measuring conductivity;
- means for measuring temperature; and
- means for measuring pH.

25

8. A system according to claim 7 wherein said system includes a single light source and a plurality of detectors.

9. A system according to claim 8 wherein said system includes a light source and a first and second detector, said first detector measuring transmission and said second detector measuring reflectance, said first detector generally positioned at an angle approximately 180° away from said light source and said second detector being positioned at any angle between about 0° and 90° from said light source.

30

10. A system according to claim 7 wherein said system includes a plurality of light sources and a plurality of detectors.

11. A system according to claim 10 wherein said system includes a first light source and a second light source, and a first and second detector, said first detector generally positioned at an angle approximately  $180^\circ$  away from said first light source and measuring transmission from said first light source, and said second detector measuring reflectance from said second light source, said second detector being positioned at any angle between about  $0^\circ$  and  $90^\circ$  from said second light source.

12. A system according to claim 7 where there is a plurality of light sources.

13. A system according to claim 12 wherein said system includes a detector, a first light source generally positioned at an angle approximately  $180^\circ$  away from said detector, and a second light source positioned between about  $0^\circ$  and  $90^\circ$  from said detector, said detector functioning as a transmission detector with respect to said first light source and as a reflectance detector with respect to said second light source.

14. A system according to claim 7 wherein said system includes a plurality of detectors.

15. A system according to claim 1 wherein said collection and sampling sub-unit, said electronics sub-unit, and said communications link therebetween of said toilet unit are integrated into a single unit, said integrated unit removably fastened inside the toilet bowl.

16. A system according to claim 1 wherein said electronics sub-unit includes at least one of the following elements:

- a main processing unit;
- a communications link to said wall unit; and
- an internal power supply.

17. A system according to claim 16 wherein said power supply is a battery.

18. A system according to claim 1 wherein said wall unit includes at least one of the following elements:

- a main processing unit;  
a database memory block;  
a front panel display;  
a means for inputting information;  
5 an RFID transceiver;  
a power supply;  
a communications link to said toilet unit; and  
a communications link to a central institutional computer.
- 10 19. A system according to claim 18, wherein said communications link between said wall unit and said central institutional computer includes a wireless communications link.
20. A system according to claim 18, wherein said communications link between said wall unit and said central institutional computer includes a wired communications link.
- 15 21. A system according to claim 18, wherein said communications link between said wall unit and said toilet unit includes a wireless communications link.
22. A system according to claim 18, wherein said communications link between said wall unit and said toilet unit includes a wired communications link.
- 20 23. A system according to claim 18, wherein said power supply includes a battery power supply.
- 25 24. A system according to claim 1, wherein said wall unit is detachable, transportable and usable with a plurality of sanitary installations.
25. A method for measuring at least one characteristic of urine of an individual for determining if there is a deterioration in the health of the individual, wherein said method  
30 includes the steps of:  
positioning a means for collecting and measuring at least one characteristic of urine in a toilet bowl;  
collecting urine passed by an individual within the means for collecting and measuring;  
measuring the value of the at least one characteristic of the collected urine;

comparing the measured value of the at least one characteristic of the collected urine with a pre-determined statistical threshold for that at least one characteristic, the statistical threshold being calculated from a pre-determined series of similar measurements of that characteristic; and

5 indicating that the measured value exceeds the statistical threshold of the at least one measured characteristic of urine, thereby to indicate changes in an individual's urine which may signal deterioration in the individual's health.

10

26. A method according to claim 25 further comprising a step of testing the reasonableness of the measured characteristic of the collected urine.

27. A method according to claim 25 further comprising the step of identifying the user whose urine is to be collected and for which a measurement of at least one characteristic of urine is to be made.

15

28. A method according to claim 25 wherein said step of measuring includes the step of measuring the concentration of at least one constituent of urine.

29. A method according to claim 25 wherein said step of measuring includes the step of measuring the amount of at least one constituent of urine.

20

30. A method according to claim 25 wherein said step of measuring includes the step of measuring the temperature of the urine.

25

31. A method according to claim 25 wherein said step of measuring includes the step of measuring the conductivity of the urine.

32. A method according to claim 25 wherein said step of measuring includes the step of measuring the pH of the urine.

30

33. A method according to claim 25 wherein said step of comparing includes comparing the measured value of a characteristic of urine to a threshold statistical value based on an average of several similar measurements over a predetermined period of time.

34. A method according to claim 25, wherein said step of comparing includes comparing the measured value of a characteristic of urine to a threshold statistical value based on the standard deviation of several similar measurements over a predetermined period of time.
- 5 35. A method according to claim 25 wherein said step of comparing includes comparing the measured value of a characteristic of urine to a threshold statistical value based on a percentage of the average of several similar measurements over a predetermined period of time.
- 10 36. A method according to any one of claims 33-35 wherein the predetermined period of time has starting and ending dates which may change.
37. A method according to any one of claims 33-35 wherein the predetermined period of time is a fixed period having fixed predetermined starting and ending dates.
- 15 38. A method according to claim 25 wherein said step of comparing the measured value of the at least one characteristic of urine is a step of comparing at least two characteristics of urine, each of the characteristics having a different pre-determined statistical threshold.